

# **Radon: The Health Threat with a Simple Solution!**

**Douglas L. Kladder**

**National Environmental Health Association  
Center for Environmental Research and Technology**

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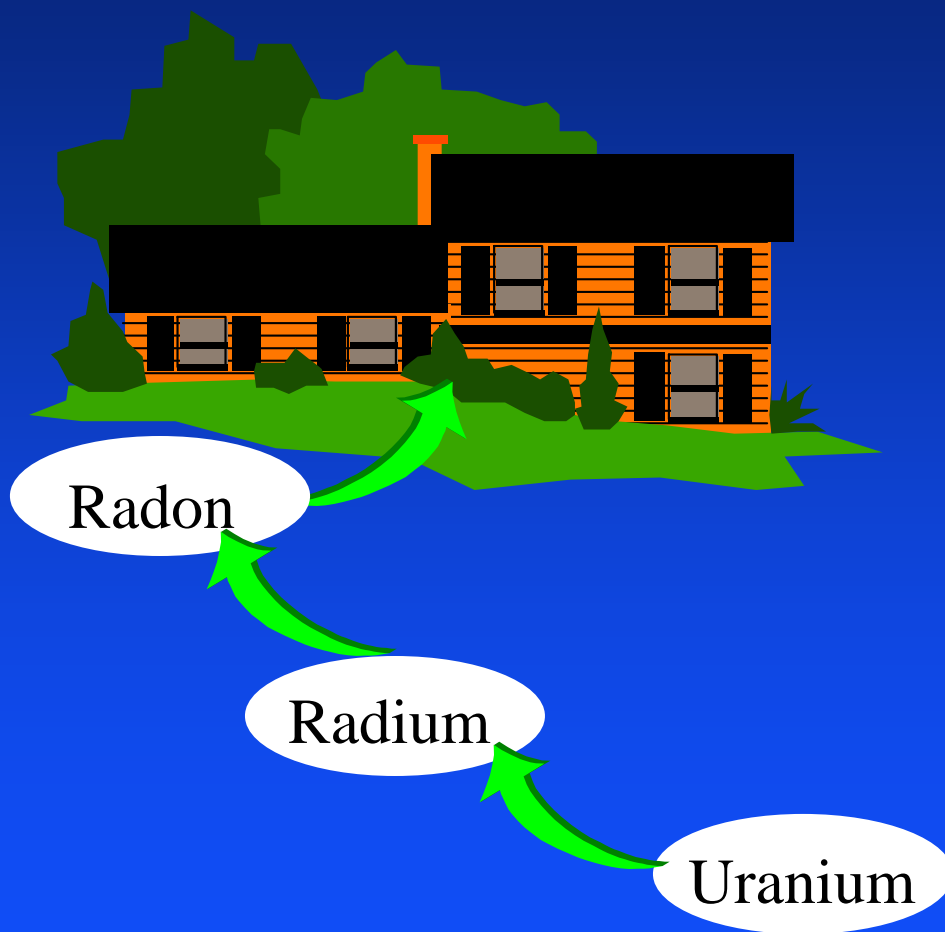
# Radon Is:

- A significant cause of lung cancer
  - ◆ 1 in 4 lung cancer cases among non-smokers
  - ◆ 21,800 lung cancer cases per year in U.S.
- Easy to test for
  - ◆ Can be conducted by professionals, maintenance staff and consumers
- All radon concerns can be fixed!
  - ◆ Orders of magnitude less than asbestos programs
  - ◆ Can benefit other IAQ concerns

Let's get technical, for a moment

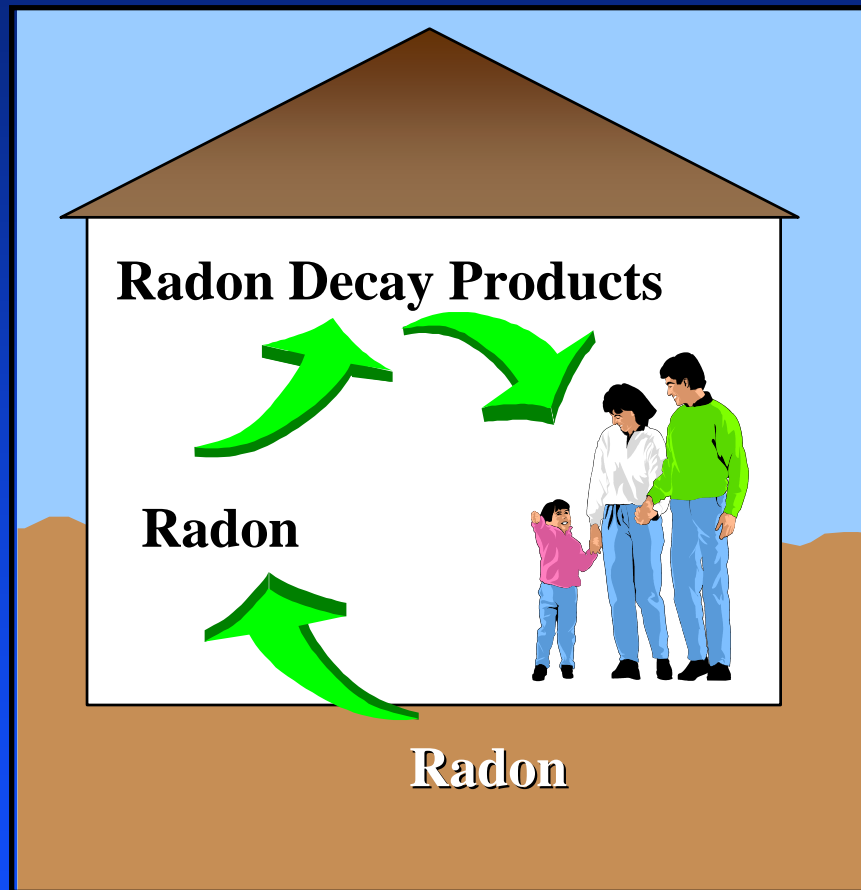


# What Is Radon?



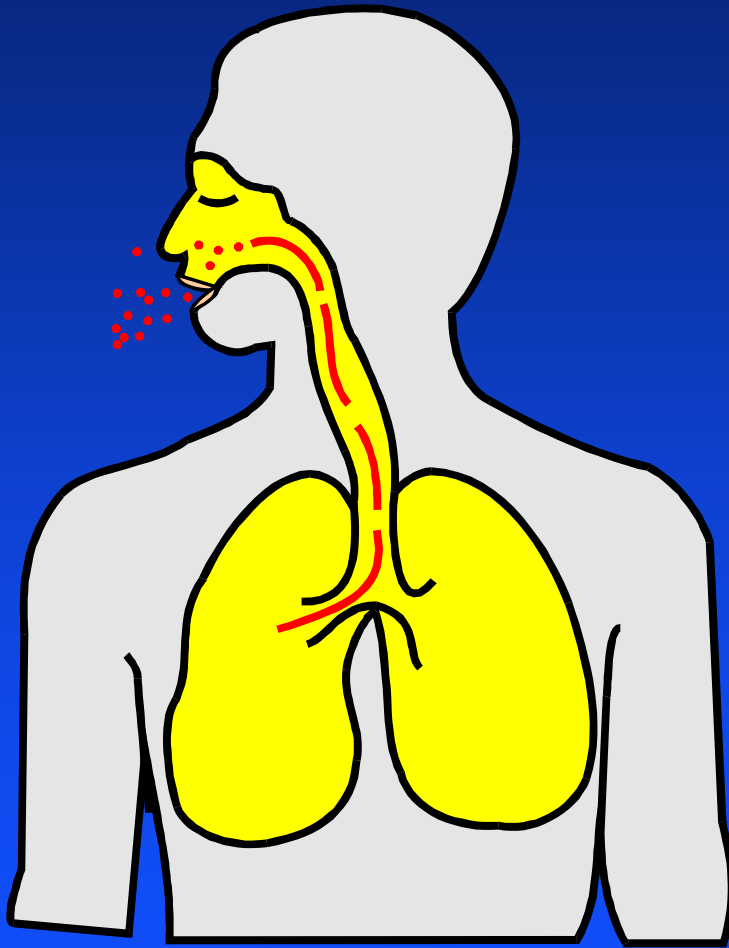
- Radon is a gas.
- It is naturally occurring.
- It cannot be seen or smelled.
- It enters buildings from the soil beneath them.

# Why Is Radon A Concern?



- Radon further decays into a family of elements called radon decay products
  - ◆ Polonium
  - ◆ Lead
  - ◆ Bismuth
- Radon decay products can be inhaled
  - ◆ Adhere to lung tissue
  - ◆ Radioactive

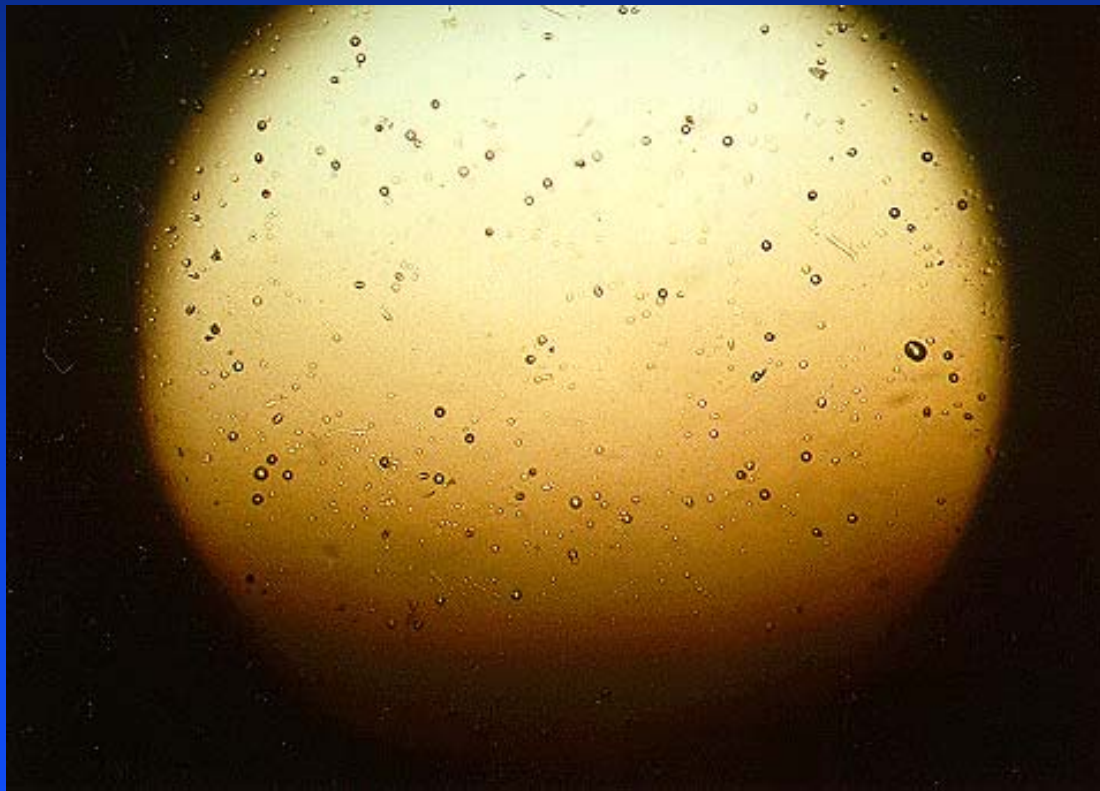
# Radon Is A Lung Cancer Causing Gas



- Radon decay products inhaled.
- Radon decay products release alpha radiation
- Damaged cell can increase potential for lung cancer.

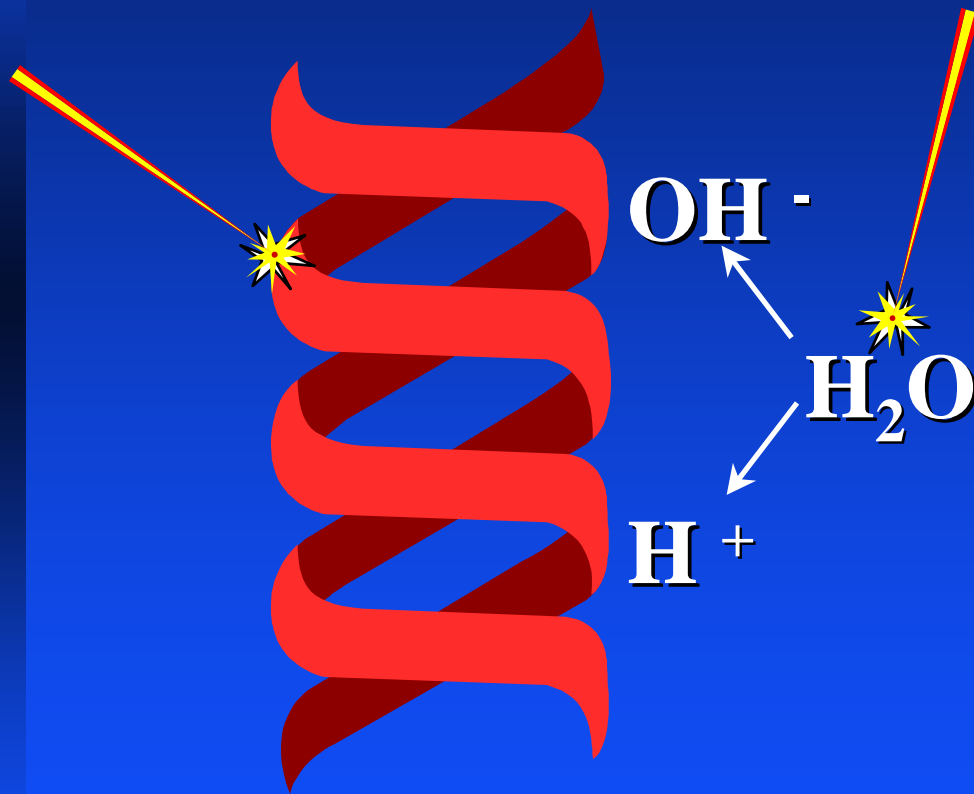


# Alpha Particles Are Strong Enough To Pit Plastic



- Plastic chip from passive radon test (alpha track)
- Magnified only 100 times
- 3 months at EPA Action Level of 4 pCi/L

# What Happens When Radon Decay Products Are Inhaled?



- Highly radioactive particles stick to lung tissue, where they can irradiate sensitive cells.
- Radiation can alter the cells, increasing the potential for cancer.

Chromosome 6, P53 gene impacted



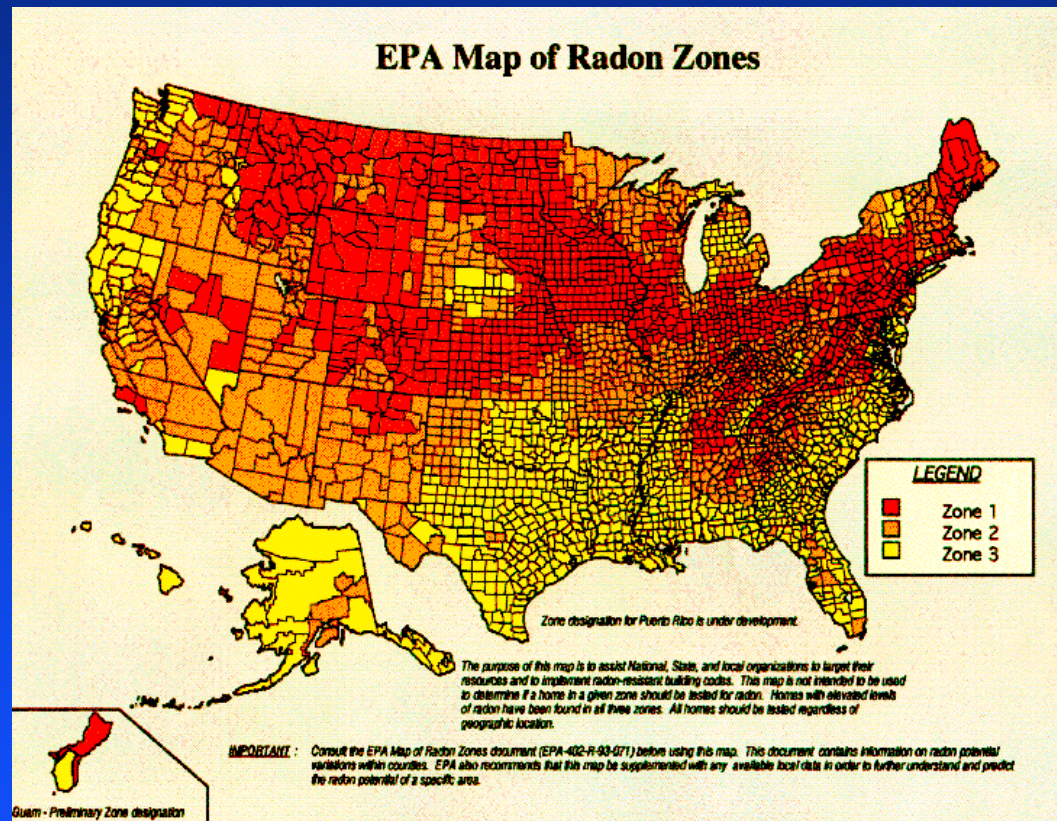
# EPA & Surgeon General Recommend That People Not Have Exposures Above 4 pCi/L On A Long-Term Basis

- One is advised to take action if a home is at or above 4.0 pCi/L
- Average indoor: 1.3 pCi/L
- Average outdoor: 0.4 pCi/L

# How Does Radon Rank As A Cancer Causing Agent?

- Radon is ranked as a Group A carcinogen
  - ◆ Highest ranking for cancer potential
  - ◆ Known to cause cancer in humans
  - ◆ Tobacco smoke and tobacco products in same category
- Provides basis for regulatory and liability concerns!

# Are There Just A few Areas Where Radon Concerns Exist?



No!

Many parts of the country have radon concerns.

1 in 15 buildings can be at or above EPA Guidance

Affects:

Schools,  
Homes,  
Workplaces

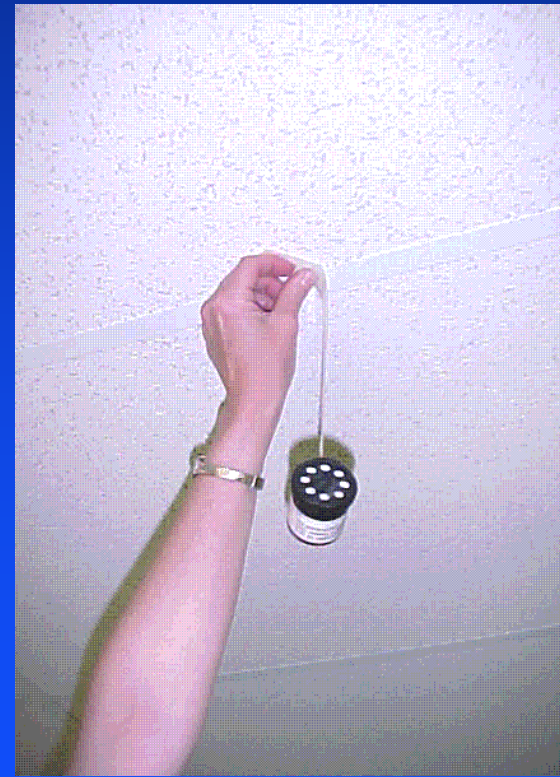
The only way to know if levels are elevated is to test!



# Short And Long-Term Testing Devices Help Determine the Need for, and Effectiveness of, Radon Mitigation



Short-term test devices



Long-term test devices

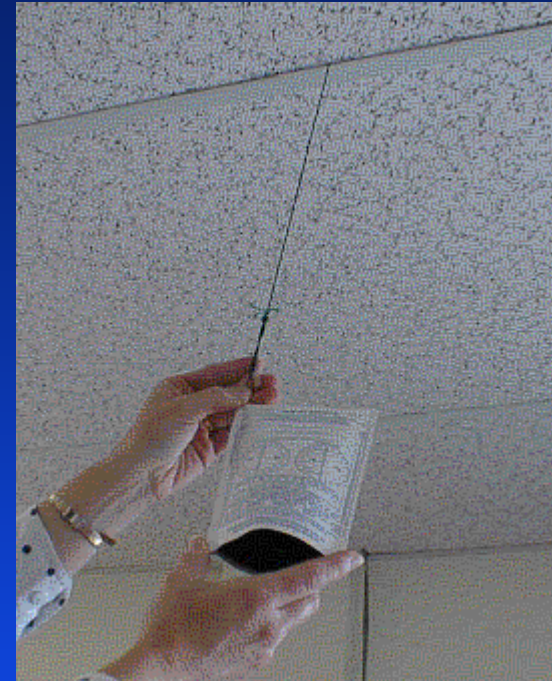
# Testing Approaches-Schools

- Test during school year and under conditions of occupancy
  - ◆ Not on weekends
- Can be deployed by maintenance staff or professionals
- Every room in contact or above with soil
  - ◆ Not upper floors
- Cost:
  - ◆ Devices (including analysis): \$15.00/device plus labor



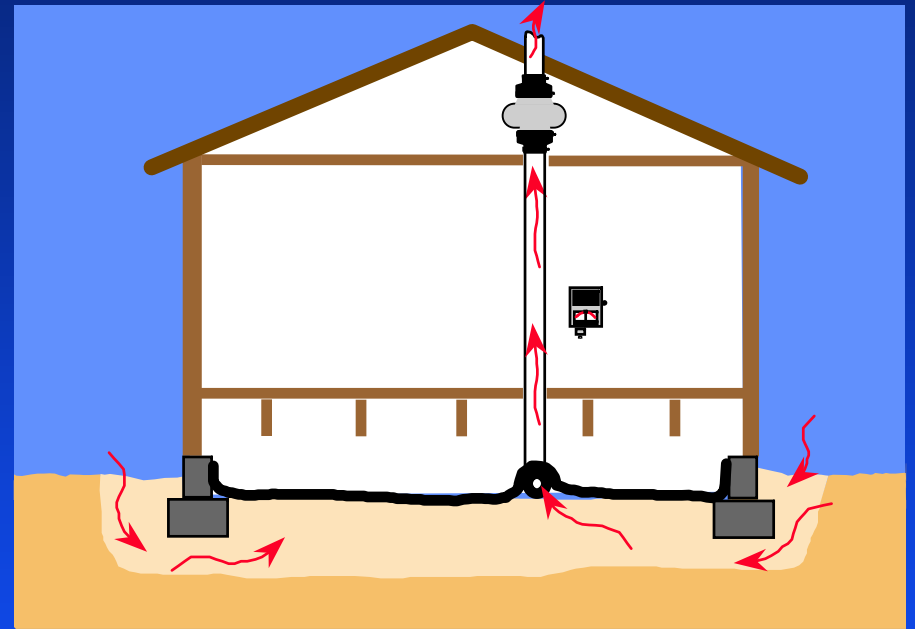
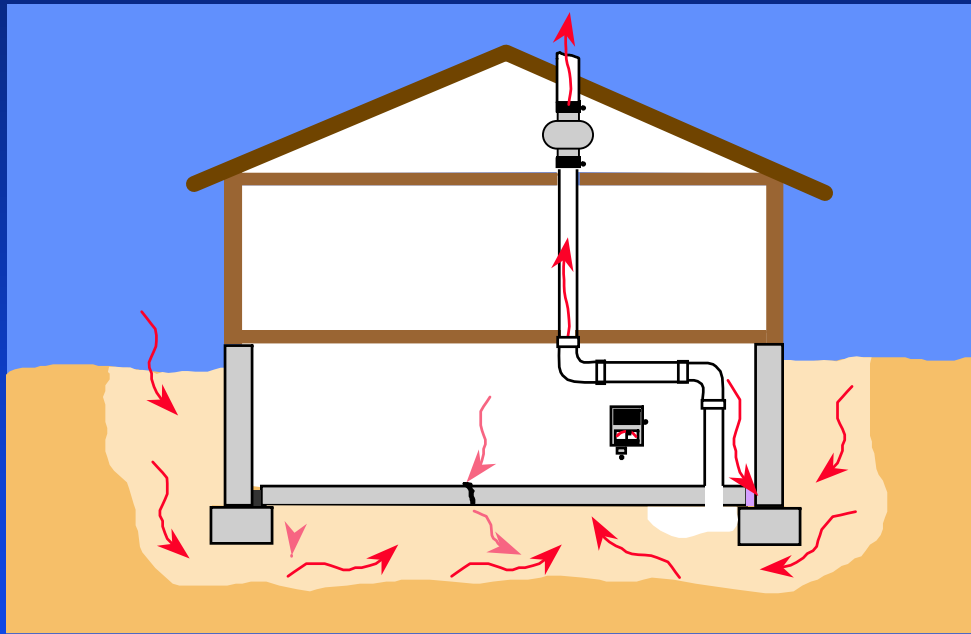
# Testing Homes

- Test devices can be deployed by homeowners
  - ◆ State agencies
  - ◆ CFA
  - ◆ Private laboratories
- Cost: \$9.95 to \$15.00 including analysis
  - ◆ National Safety Council offers coupons for self-testing
  - ◆ Some states have aggressive programs
- Easy



Short-term Radon  
Test Device  
Easily deployed

# All Buildings With Radon Concerns Can Be Fixed!



Active soil depressurization is a means of creating a vacuum beneath a slab or plastic sheet and collecting the radon before it enters a building.

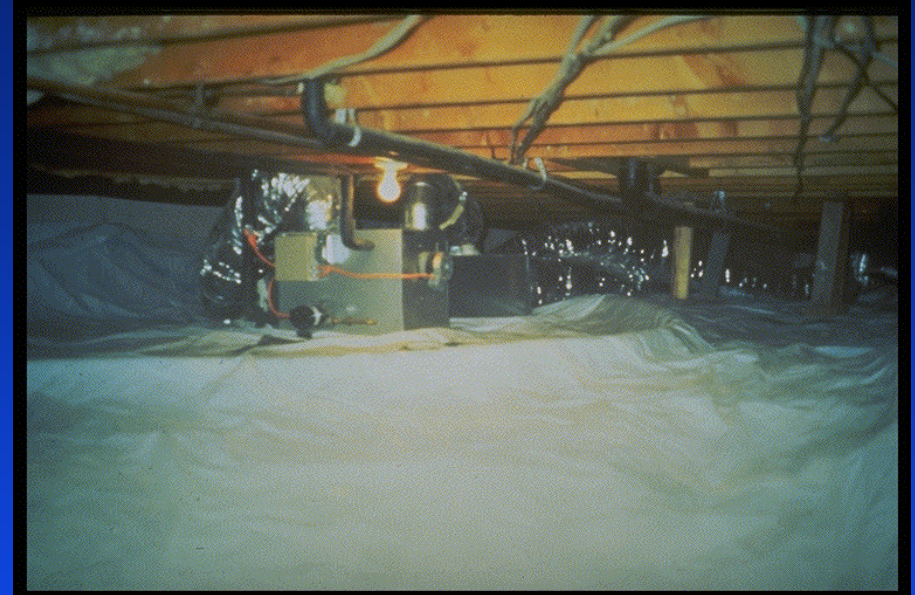
# Can't We Just Seal The Cracks?



- Radon can enter through very small openings.
- Without affecting house pressures, sealing is not a stand-alone technique.



# Treating Crawl Spaces



- Length of perforated pipe on soil
- High density, 4 mil. cross-linked or 6 mil polyethylene
- Seal to walls, seams and at pads

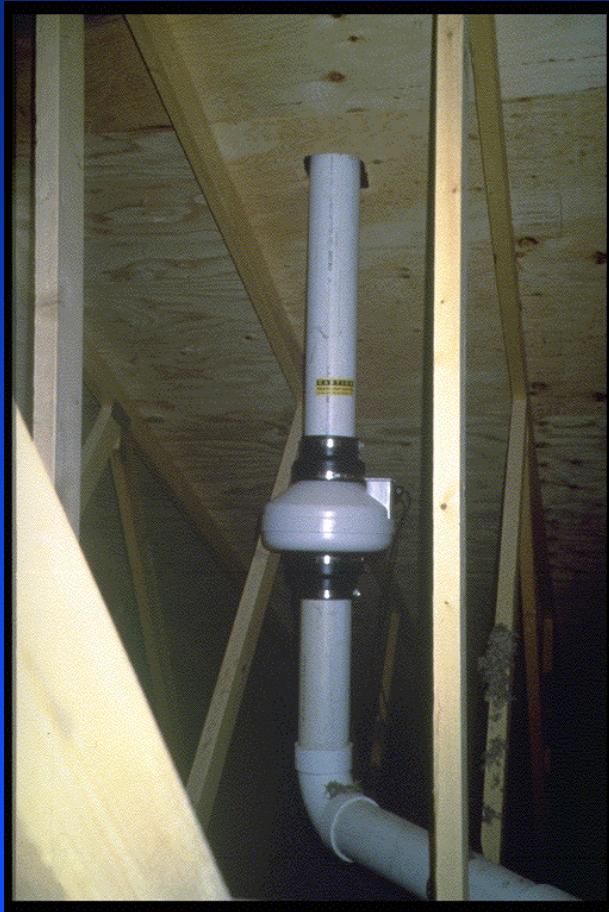
# Perforated Pipe Connected To Suction System



- Perforated pipe connected to solid Sch. 40 PVC pipe
- Riser routed to fan
- Pipe labeled
- Plastic helps dry out crawl space and reduce mildew and odors



# System Depressurization Fan



- Installed in attic, garage, or outside
- Must not be installed inside of house
- Quiet
- 90 watt fan runs continuously
- 11 year expected life

# Suction Point For Slabs And Basements



- Hole cut through slab
- Pit dug out
- PVC pipe connected to hole
- Pipe routed to fan
- May require more than one suction point



# System Discharges Away From Building Openings



- Discharge should be high to avoid radon entering building
  - ◆ Minimum of 10 feet above grade
  - ◆ 10 feet from openings, 2 feet below discharge
  - ◆ Above eave
- Rain cap not recommended
- 1/4 inch bird screen

US EPA Mitigation Standards <http://www.epa.gov/iaq/radon/pubs/>

# Mitigation System on School



- Typically external
- Discrete system
- Generally only a small number of rooms must be treated



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# Mitigation Systems

## ■ Homes

- ◆ Typically 1 system
- ◆ Average Cost: \$1,000 or less than 1% of value

## ■ Schools

- ◆ Typically only 5-10% of rooms elevated
- ◆ Typically 2-3 systems
- ◆ Cost: <\$15,000 for building
- ◆ Sometimes can be treated by adjusting HVAC system



# Pet Peeve - Schools

- Fresh air make-up shut-off
  - ◆ Done so to reduce energy cost
  - ◆ Reduces dilution
  - ◆ Reduces interior pressure
  - ◆ Increases radon levels
  - ◆ Causes other IAQ problems



Fresh Air Open



Fresh Air Closed

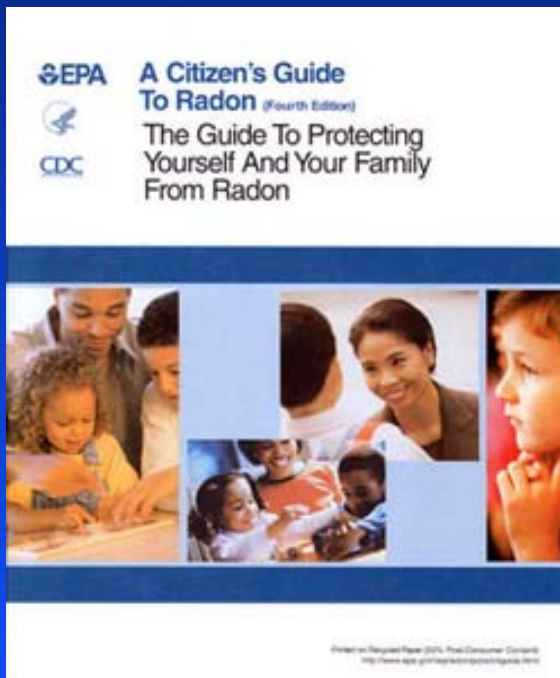
# When to Be Concerned About Radon

- Wherever children are indoors
  - ◆ In schools
  - ◆ Daycare
  - ◆ At home
- When modifying HVAC systems
- When new buildings are constructed

In other words-in all situations!

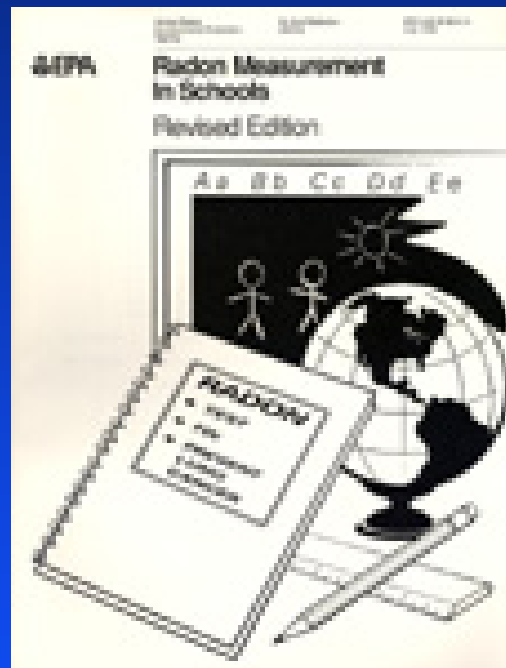
# EPA Documents

## Citizen's Guide



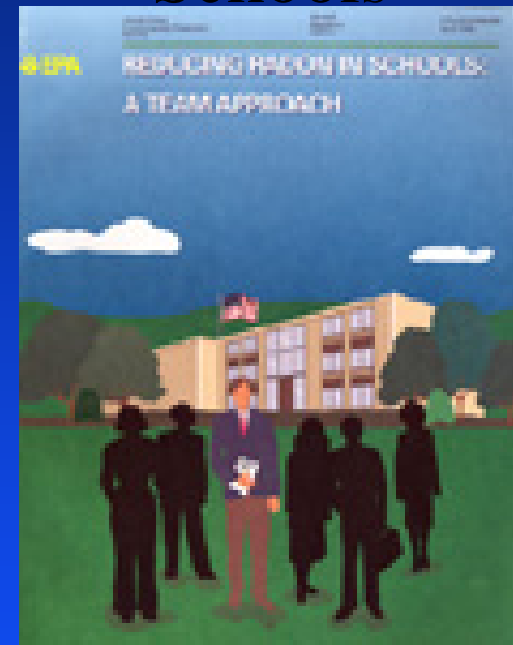
What it is & how to test

## Radon in Schools



Testing protocols

## Reducing Radon in Schools



How to fix radon

<http://www.epa.gov/iaq/radon/pubs/>

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Radon Doesn't Have  
To Be A Problem  
Unless You Ignore It



Doug Kladder NEHA/CERTI

800-513-8332